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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,892	07/03/2003	Howard E. Rhodes	M4065.0646/P646	3670

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EXAMINER

LANDAU, MATTHEW C

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 07/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/611,892	Applicant(s) RHODES, HOWARD E.	
	Examiner Matthew Landau	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-7,9,10,13-20,26-34,37-39,41-46,48 and 49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,4-7,9,10,13-20,26-34,37,38 and 41-45 is/are allowed.
- 6) ☒ Claim(s) 39,46,48 and 49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Claim 38 directed to an allowable product. Pursuant to the procedures set forth in MPEP § 821.04(B), claim 44, directed to a non-elected species, previously withdrawn from consideration as a result of an election of species, is hereby rejoined and fully examined for patentability under 37 CFR 1.104.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the single active area extension region and said halo implant overlapping at least part of said floating diffusion region (claim 39) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

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pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 39 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation “said single active area extension region and said halo implant overlapping at least part of said floating diffusion region” is not sufficiently supported by the originally filed application. The drawings show the active area extension region and the halo implant adjacent the floating diffusion region 28, but neither the drawings nor the specification show or describe those regions overlapping the floating diffusion region. Therefore, the above limitation constitutes new matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 46 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens in view of Kuriyama and Komuro.

Regarding claim 46, Figures 2 and 3 of Stevens disclose a pixel array, at least one pixel of said array comprising: a photoconversion device (photodiode) PD, and a first transistor gate 76 (transfer transistor) in electrical contact with said photoconversion device at a first side of said transistor gate, and said gate has a gate length which is increased relative to other transistors (RG and unlabeled transistor to the right of transistor 100). Note that the instant application defines the gate length as the distance labeled 44 in Figure 1(a) (see paragraph [0033]). It is clear that the corresponding feature in Figures 2 and 3 of Stevens is larger in the first transistor TG than in the other two transistors indicated above. It is inherent that the pixel array of Kuriyama supplies signals to some type of image processor. A difference between Stevens and the claimed invention is said transistor gate having a single active area extension region (LDD region) on a second side of said transistor gate opposite said first side. Figure 1 of Kuriyama discloses a single active area extension region 14b (LDD region) on one side of a transfer transistor and a photodiode 13 (col. 5, lines 65-67) on the opposite side. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made

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to modify the invention of Stevens by including an active area extension region (LDD region) on the second side of the first transistor for the purpose of suppressing deterioration of the element properties (col. 6, lines 16-18 of Kuriyama). A further difference between Stevens and the claimed invention is a halo implant below said LDD region and a threshold voltage adjustment implant in the channel region. Figure 5C of Komuro discloses a MOS transistor with a halo implant region (threshold voltage implant) 14 formed in the channel (below an LDD region). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Stevens and Kuriyama by including a halo implant region as taught by Komuro for the purpose of suppressing the short channel effect and also the hot carrier generation (see abstract of Komuro). Although Komuro refers to region 14 as a pocket implant region, it is known in the art that terms “pocket” and “halo” are synonymous. It is also known that a halo (pocket) implant region affects the threshold voltage of a transistor. Therefore, it can be considered that the halo implant is also a threshold voltage adjustment implant. Note that it is considered that the “channel region” is the region between the source and drain.

Regarding claim 49, Figures 2 and 3 of Stevens disclose a source/drain region 80. Note that both the active area extension region and the source/drain region will be spaced away from the gate 76 by a portion 74 of a substrate 73/74 (Figure 3 of Stevens). Note that insulating film 74 can be considered to be part of the substrate.

Claim 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens in view of Kuriyama and Komuro, as applied to claim 46 above, and in further view of Choi.

Regarding claim 48, a further difference between Stevens and the claimed invention is a threshold voltage adjustment implant below a gate of said transistor. Figure 5 of Choi discloses a MOS transistor comprising a source/drain extension region 126, a halo implant region 120C, and a threshold voltage adjustment implant region 120A (col. 6, lines 25-28 and lines 39-49). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Stevens by additionally including a threshold voltage adjustment implant for the purpose of compensating for the edge effect associated with the halo implant and reducing junction capacitance (see abstract of Choi).

Allowable Subject Matter

Claims 1, 4-7, 9, 10, 13-20, 26-34, 37, 38, and 41-45 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claims 1, 15, 26, and 32, the reasons for allowance were provided in the Office Action mailed on February 15, 2006.

Regarding claim 38, the prior art of record, either singularly or in combination, does not disclose or suggest the combination of limitations including an n-type layer over said single

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active area extension region, wherein said transistor has a gate length that is greater than that of any other transistor of a same pixel.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed May 15, 2006 have been fully considered but they are not persuasive.

Applicant argues that Fig. 2 of Stevens shows the transistor (with gate 76) does not have a greater gate length than the other transistor gates of the pixel. However, the claim language merely requires the transistor has a gate length "greater than that of *any other* transistor of a same pixel" (emphasis added). This is not the same as stating the gate length is greater than all other transistors. As long as the gate length is greater than one other transistor gate in the pixel, the limitation is met. It appears Applicant has recognized this distinction since claim 32 includes the language "greater than that of all other transistor gates".

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

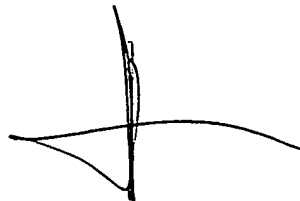
The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should any questions arise regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew C. Landau

July 10, 2006

A handwritten signature in black ink, appearing to read 'K. Parker', written over a horizontal line.

KENNETH PARKER
SUPERVISORY PATENT EXAMINER